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Federal Communications Commission
Office of the Secretary

REDACTED FOR PUBLIC INSPECTION

BY HAND DELIVERY
Marlene H. Dortch, Secretary
Federal Communications Commission
445 Twelfth Street, SW
Washington, D.C. 20554

Re: *Request for Connect America Fund Cost Models,* FCC Public Notice in WC Dockets 10-90 and 05-337, DA 11-2026 (Wireline Competition Bur. , rel. Dec. 15, 2011) – Submitted Pursuant to *Second Protective Order* in WC Docket Nos. 10-90 and 05-337, DA 12-192 (Wireline Competition Bur., rel. Feb. 10, 2012)

Dear Ms. Dortch:

Pursuant to the Public Notice and Second Protective Order cited above, Alaska Communications Systems Group, Inc., on behalf of its four LEC subsidiaries ("ACS"), hereby files certain information that is proprietary and highly confidential to ACS. ACS has marked each page of the enclosed Stamped Highly Confidential Documents with the required legend indicating its highly confidential nature, as required in paragraph 5 of the Second Protective Order, and has indicated that the documents contain such sensitive information that the copying of the Stamped Highly Confidential Documents is restricted, as provided for in paragraph 6 of the Second Protective Order.

Please find herewith one copy of ACS's Stamped Highly Confidential Documents as defined in the Second Protective Order, and two copies redacted for public inspection. ACS also provides two copies of each Stamped Highly Confidential Document for Katie King. Please direct any questions regarding this matter to me.

Very truly yours,

Karen Brinkmann

Karen Brinkmann
Counsel for Alaska Communications Systems

cc: Katie King, TAPD, Wireline Competition Bureau

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Alaska Communications Broadband Network Cost Study Model

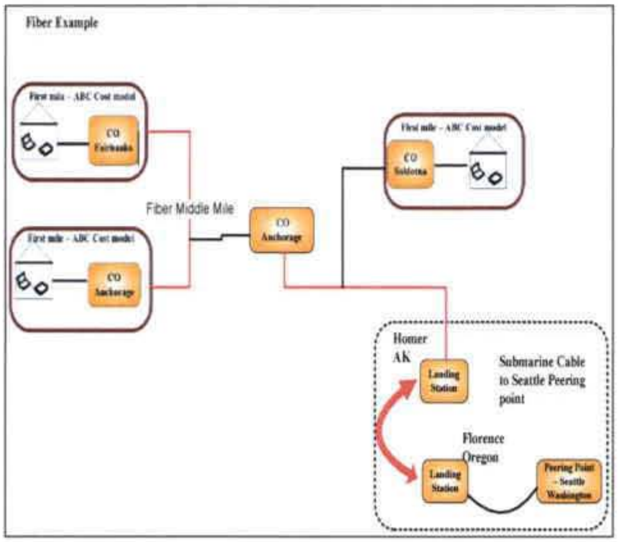
Methodology and Assumptions

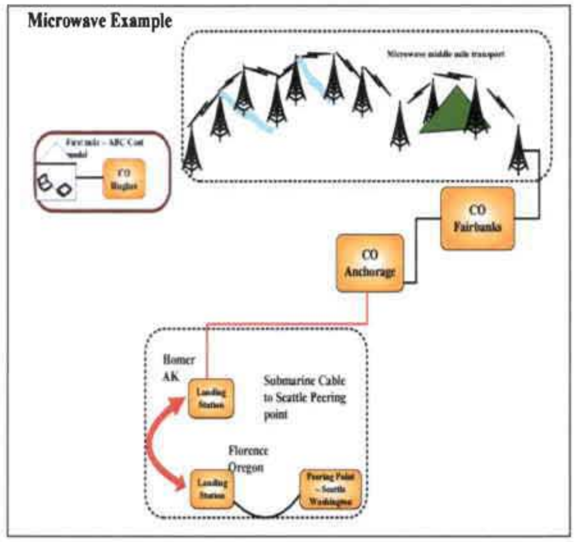
The Alaska Communications Systems Group, Inc. (ACS) model estimates the cost to provide broadband in Alaska that a national broadband cost model will not. Because of the limited road system in the state, 2nd mile transport from the serving wire center at a village off the road system must be provided via satellite or microwave transport.[1] Equally unique to an insular area such as Alaska, the lack of an Internet peering location in the state requires that middle mile transport be provided via undersea cable from Alaska to peering locations in Seattle, Washington and Portland Oregon. The need for transport via satellite, microwave and undersea cable systems introduce costs that will not be present in a national model that assumes backhaul via fiber to a point on a regional ring within the same LATA. The Commission provides a hypothetical terrestrial network design running from the customer location to the nearest Internet peering point.[2] The ABC Coalition's CQBAT model develops costs up to the nearest Internet peering location but assumes that the peering location is located at a regional tandem within the same LATA and that it is connected to the customer's premise via a regional fiber ring.[3] Neither of these frameworks contemplates the need for satellite, microwave or undersea cable transport. The ACS model produces forward-looking estimates of the costs of these missing pieces that should be added to any national model's results to produce a more complete and accurate picture of the costs of providing broadband in Alaska. As the schematics below demonstrate, broadband provisioning requirements in Alaska do not match the framework assumed by the FCC for the lower 48.

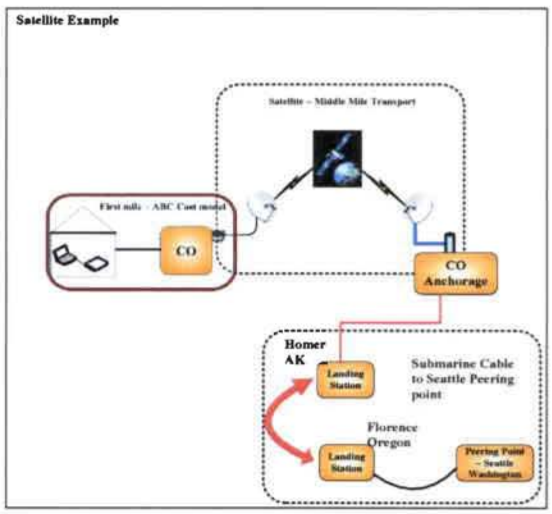
[1] In the case of some villages served by ACS, such as Akutan in the Aleutian Island chain and Kaltag in the west-central portion of the state, microwave 2nd mile transport is not feasible due to extreme distances. The only option for service would then be satellite transport.

[2] Order at 111.

[3] ABC Coalition, July 29, 2011, Attachment 3, page 13 (ABC).







The ACS Model shows that the costs to provide broadband service will exceed by a significant amount the estimates of a national model that assumes backhaul up to a point on a regional ring within the same LATA. The amounts range from **[REDACTED]** for customer locations in the **[REDACTED]** up to **[REDACTED]** for **[REDACTED]**.

ACS believes these results under estimate true forward-looking costs. The CQBAT model does not include specific Alaska costs.

The model assumes a broadband take rate of **[REDACTED]** based on analysis of penetration reports of companies in Alaska where broadband is offered today.[4] The model also assumes a monthly capacity limit per customer of 10 Gbps – the lowest acceptable level in order to maintain parity with urban offerings.[5]

As its methodology, the ACS model adds the estimated cost from the CQBAT model to the ACS model's results for the cost of the undersea cable middle mile, and the applicable 2nd mile cost. Of ACS' 81 local serving areas, only **[REDACTED]** had a total broadband monthly cost of less than **[REDACTED]** per customer and all of those were in **[REDACTED]**. While these **[REDACTED]** areas contained **[REDACTED]** of the expected total broadband customers, they represented only **[REDACTED]** of the estimated costs.

Summary of the ACS Model Results

On the Tab labeled "Results" the results of the ACS Model are presented. For each local serving area served by ACS, the model shows the estimated per customer location costs for the 2nd and middle mile broadband transport. These costs are added to the predictions derived from the CQBAT model for these same areas to produce a total cost estimate.[6]

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[4] Combined penetration rate assumption based on analysis of 2010 ACS Communications and General Communications, Inc. annual reports filed with the SEC.

[5] Order at 99 .

[6] The CQBAT model does not include the cost to provide voice service. The Order includes voice as a supported service. ACS assumes that any national model filed in response to the December 15th Public Notice will include the costs associated with switched service. ABC Coalition, July 29, 2011 Attachment. 1, page 3.

For most of Alaska, with the exception of Anchorage, Fairbanks, and Juneau, each town or village is served by a single central office. Based on the location of the town, the distance and terrain between it and other towns or villages around it and whether it is on the road system, ACS engineers have determined how, using a greenfield approach to develop a continuous forward-looking broadband network, the area would be connected to one of the three regional aggregation points served by ACS – Anchorage, Fairbanks or Juneau.

For those local serving areas on the road system, the model assumes that the town would be connected to one of the regional aggregation points via fiber.[7] The **[REDACTED]** ACS local serving areas connected by fiber include the wire centers in the three largest cities, Anchorage, Fairbanks and Juneau, as well as the other towns that are able to be connected via the road system. The ACS model includes no additional 2nd Mile transport cost for those service areas on the fiber network beyond what would be contained in a national model. This assumption is conservative since the fiber route connecting a service area to a regional aggregation point may still be hundreds of miles. For others, the ACS engineers have determined that because a town is on a river system or other reasonable terrain and within a reasonable distance from other towns or points along the road system, the model requires microwave system 2nd mile transport.[8]

Based on the algorithms described below, the ACS model estimates the cost of providing the broadband microwave link between the village and the nearest fiber connection point. Finally, for those villages beyond even microwave's capability, the model assigns satellite-based second-mile transport from an earth station located in the village to one in Anchorage. The model

[7] Owing to the extreme size of Alaska as well as the topology that prohibits direct routing, once connected to the fiber network, much of the broadband traffic in Alaska must still travel hundreds of miles via fiber before it reaches a regional aggregation point at Anchorage, Fairbanks, or Juneau.
[8] ACS has included as microwave 2nd mile transport to all villages where a microwave system is technically feasible. In some cases the cost to provide a microwave service may be higher than that available under leased satellite service. This cost difference represents in part the FCC's differing requirements for microwave (4Mbps down, 1 Mbps up) and satellite (1Mbps down, 256 kbps up).

estimates the costs of providing the satellite link based on currently negotiated satellite lease costs.

Of ACS's 81 customer serving areas in Alaska, **[REDACTED]** of them will have 2nd mile transport via fiber, **[REDACTED]** via microwave, and **[REDACTED]** via satellite.

Those areas served via microwave have per-customer 2nd mile costs that range from **[REDACTED]** for a shared system that connects **[REDACTED]** (363 households) and **[REDACTED]** (354 households) to **[REDACTED]**, which is connected via fiber to **[REDACTED]**, to **[REDACTED]** for a shared system that connects **[REDACTED]** (23 households) and **[REDACTED]** (38 households) to **[REDACTED]**, near **[REDACTED]**. The analysis shows that the primary driver of per customer microwave cost is the number of broadband customers served over a given system. This is due to the high degree of fixed cost components required to provision a system. The radio equipment modeled by ACS can handle up to **[REDACTED]** on a given system in increments of **[REDACTED]**. For each microwave hop the model assumes a cost of **[REDACTED]** for a single tower and **[REDACTED]** for the tower at the other end and the radio, power, and other equipment required at each end in order to provide **[REDACTED]** of bandwidth. The common equipment can service equipment capable of providing two additional **[REDACTED]**

[REDACTED] increments for **[REDACTED]** for each increment. For the initial **[REDACTED]** required at a location, ACS would be required to invest **[REDACTED]** for an anchor tower and the necessary radio equipment for a single hop transport link whether the number of broadband customers in the village served is 3 or 300. However, spreading these costs over 3 or 300 customer locations will yield vastly different unit costs

For the **[REDACTED]** local serving areas that are served via satellite systems, the model estimates the cost of 2nd mile transport based on the lease rate recently negotiated between ACS and a satellite provider and the estimated forward-looking cost required to provision the equipment necessary to bring the signal from the earth station to the local aggregation equipment at the central office. This results in per customer cost of providing broadband service ranging from **[REDACTED]** in the village of **[REDACTED]** (383 households), up to **[REDACTED]** in the village of **[REDACTED]** (12 households). Again, a primary driver of the per-customer cost is the number of customers across which the costs may be spread. As a result, a village of almost 400 households will have a much lower unit cost than an area with only 12.

Model Framework, Output and Assumptions:

The ACS model takes the common form of a forward-looking LRIC cost model. The model first estimates the investment necessary to provide 2nd mile and middle mile transport. The level of investment reflects the Commission's requirements of speed, latency and capacity based on the number of customer locations and a take rate assumption consistent with broadband subscribership in Alaska. Next, the model develops annual operating and capital cost factors designed to calculate the annual cost (or revenue requirement) based on the estimated investment and the ratio of booked plant-specific expense to booked investment by plant category. Finally, expected broadband demand, defined as the number of customer locations multiplied by an expected take rate, is divided into the annual cost to yield a per customer cost.

The additional Alaska-specific broadband costs that must be added to the results of the model are calculated for each central office or remote terminal in ACS service areas. While the ACS model presents the cost at a serving area level, it includes data at the census block level for each area. For example, the community of Pedro Bay has 33 households spread over 22 census blocks, **[REDACTED]** . The per-customer cost associated with providing the **[REDACTED]** 2nd mile transport from Pedro Bay to the aggregation point at **[REDACTED]** will be the same for customers in each of the 22 census blocks. In the case of the middle mile transport via undersea cable from Anchorage or Juneau to Seattle, all ACS customer locations in the same servicing area will have the same cost additive since all Internet traffic accesses the undersea cable facilities in Anchorage or Juneau.

Specifically, the ACS model estimates the forward-looking cost of the Alaska-specific segments of the broadband network to be added to the model through the following processes. For the microwave system, 2nd mile transport and undersea cable middle mile transport the model follows the list below:

1) The model calculates the forward-looking network investment for microwave and undersea cable links based on the capacity necessary to serve the estimated number of ACS customer locations within the speed, latency and capacity requirements adopted by the Commission in the Order;

2) The model estimates the forward-looking expenses necessary to operate and maintain the forward-looking investment by developing annual cost factors equal to the ratio of the

current actual expenses by network function to the corresponding actual investment balance. These factors are applied to the estimated forward-looking investment balances to estimate forward-looking annual operating costs;

3) The model develops return on capital and capital recovery components of the annual revenue requirement based on the Commission's default cost of capital and depreciation parameters;[9]

4) The model uses results from the three items above to develop the annual or monthly forward-looking cost (revenue requirement); and

5) The model divides the estimate of the total forward-looking cost of microwave and undersea cable links by the expected number of Broadband customers in a serving area to yield the per-customer forward-looking cost.

For satellite 2nd mile links, the model incorporates the lease rate for satellite transport currently in effect between ACS and a satellite transport provider in Alaska:

1) The monthly lease rate is multiplied by the bandwidth capacity required to provide a level of service consistent with the speed, latency and capacity standards set by the Commission to yield the monthly lease cost for the area. The required bandwidth capacity is determined based on the estimated number of broadband customers and an assumed oversubscription of **[REDACTED]** ;[10]

[9] The model uses a cost of debt derived from the ACS 2010 annual report. An "optimized" capital structure was taken from the Commission's HCPM model. The FCC's currently authorized return of 11.25% was assumed allowing the cost of equity to be calculated. The optimized capital structure was used to mitigate problems with ACS Communications' highly leveraged capital structure.

[10] Based on current network usage statistics, ACS engineers estimate that in order to meet the FCC' s transfer rate standards (4 Mbps down / 768 Mbps or 1Mbps up / 256 Kbps down for satellite), the company must engineer to no greater than a **[REDACTED]** oversubscription ratio. This means

2) The additional forward-looking investment necessary for the local aggregation equipment and routers is developed based on engineering estimates;

3) The annual carrying charge, calculated as described above, is applied to the forward-looking investment to yield the annual revenue requirement. This result is then divided by 12 to equal monthly revenue requirement for the local aggregation equipment and routers.

4) The monthly revenue requirement is added to the monthly lease cost. This sum is divided by the expected broadband customers to yield the area's monthly cost per customer of 2nd mile satellite transport.

In order to estimate the forward-looking 2nd mile and middle mile investment required to provide broadband service in Alaska, the ACS model required the development of the following inputs:

1. Determination of the bandwidth capacity required at each local serving area

ACS engineers developed algorithms that estimate the level of bandwidth investment necessary to provide broadband service at the Commission's required speed, latency and capacity requirements, reflective of the total number of households and business locations estimated for a serving area.[11] Bandwidth capacity requirements are developed for each microwave link connecting a community to the fiber network and for the undersea cables carrying Internet traffic from Alaska to the Internet peering locations in the lower 48.

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that for satellite-based service 1 Mbps of bandwidth is required for every **[REDACTED]** customers while non-satellite based service would require 4 Mbps of bandwidth for every **[REDACTED]** customers. The oversubscription ratio breaks down when the expected number of customers is very low. ACS engineers have determined that a minimum of **[REDACTED]** of bandwidth are required for each link.

[11] Speed, latency and capacity requirements are discussed in the Order at ¶¶90-99. Required speed is 4mbps down and 1mbps up. Capacity is assumed at 10 GB.

2. Customer Location Counts (Demand):

The model provides a list of local service areas (city, town village) served by ACS. For each area, the census blocks served by the central office or remote terminal at that location are identified. U.S. Census Bureau household data are used to determine the residential customer locations for each area. Based on these data and company records, ACS estimates the number of business locations within each local serving area. These customer counts are shown in the model Tab "Business Factor".

3. Estimation of 2nd Mile Transport Investment

For each service area, ACS engineers determined whether the 2nd mile transport would be most efficiently served by terrestrial fiber, microwave or satellite.[12] For areas able to be served with terrestrial fiber (those on the road system) it is assumed that the model will be capable of estimating Alaska-specific costs.[13] The model estimates the cost of 2nd mile transport based on the lease rate recently negotiated between ACS and a satellite provider and the estimated forward-looking cost required to provision the equipment necessary to bring the signal from the earth station to the local aggregation equipment at the central office.

For areas where 2nd mile transport via microwave is deemed the most efficient option, required equipment and installation costs are identified and expressed on a per unit basis (per foot, per port, etc.) For each local service area where microwave transport is selected, ACS engineers have quantified the costs of materials and equipment required to provision microwave transport at required bandwidth capacities. Equipment costs reflect purchase costs that assume all

[12] In the case of some communities, a combination of fiber and short haul marine cable is the most efficient configuration.

[13] The ability of any national model to accurately estimate 2nd mile costs for Alaska communities on the road system is subject to the reasonableness of the material and equipment acquisition and installation inputs. In addition to evaluating these inputs, ACS will review any national model's ability to account for long haul fiber routes prevalent in Alaska when the model is made available for review.

applicable ACS discounts plus installation costs. Installation costs include both contract or vendor labor costs, as well as allowances for Company engineering and technician time.

These data may be found on model Tabs "Microwave Cost Data" and "Sat Cost Dev."

4. Estimation of Undersea Cable Transport Investment:

The transport of ringing traffic from Alaska to the nearest Internet peering location in Seattle requires routes over undersea cables that connect Alaska to the lower 48.[14] The relevant costs of these facilities include provisioning and operating the undersea cables, as well as the costs of landing stations and the terrestrial fiber transmission equipment necessary to carry the signals from the landing stations in Oregon to the actual peering location.

ACS engineers have determined the necessary bandwidth capacity required for Internet traffic between Alaska and the peering location in Seattle Washington. As discussed above, the required capacity is calculated based on: 1) the Commission requirement of 4 Mbps down and 1 Mbps up speeds; 2) the number of customer locations multiplied by an assumed take rate; and 3) the assumption of a 10 Gb monthly capacity limit.

Using investment and operating cost data from the current ACS undersea cable asset records, ACS engineers identified the cost of provisioning and operating a redundant set of undersea cables capable of handling the calculated capacity requirements

5. Development of Annual Forward-Looking Costs

Using Part 32 account data for ACS local exchange operating units and the undersea cable company, the ACS model calculates annual operating cost factors ("ACFs") or carrying charges.

[14] An efficient network configuration would require redundant routing. In the ACS case, the ACS model includes the costs needed to utilize undersea cables terminating in Seattle Washington and Portland Oregon.

These cost factors are used to develop forward-looking plant-specific operating expense, corporate operations expense and capital cost levels. For example, the operating cost factor for maintenance of microwave transmission equipment for a given LEC operating company is calculated as the ratio of existing radio equipment maintenance expense to radio equipment investment. The calculated ACF is then applied to estimated forward-looking microwave transmission investment to yield the annual cost associated with the maintenance of microwave transmission equipment. Also, existing ACS plant asset levels are used to develop a support plant factor that calculates the appropriate level of support facilities investment associated with the direct transmission and cable and wire facilities plant investment.

The model calculates ACFs for several categories of operating expense (network operations, corporate operations, etc.) and for each relevant category of equipment (e.g., radio transmission equipment, central office transmission equipment and undersea cable facilities, etc.). Forward-looking support plant is estimated by multiplying forward-looking direct investment by the support plant factor. Forward-looking direct investment and support plant investment are then multiplied by the expense ACFs to yield estimated forward-looking operating expenses and taxes. The operating expense and tax annual cost factors development, as well as support plant factor development, is based on the relationships found in ACS Companies Investment and Expense account balances.

The model relies on a levelized capital cost approach to calculate the amount of annual cost necessary to recover the Company's capital costs. The Levelized Capital Cost algorithm relies on the following inputs to develop the portion of the annual revenue requirement attributable to recovering capital costs:

1. 11.25% Interstate authorized rate of return;
2. ACS Debt Ratio evaluated at current market values;
3. Most recent ACS debt cost (ACS 2010 Annual Report);
4. Economic lives based on low end of FCC Safe Harbor ranges; and

5. Economic salvage values from low end of FCC Safe Harbor ranges.

The model develops levelized capital cost factors based on the economic lives and salvage values for each major category of equipment. Economic life and salvage data will be entered into existing capital cost algorithm used in the current FCC USF forward-looking model.
For each required microwave and undersea cable link, the model contains an output page that shows the calculation of the annual revenue requirement and the per customer monthly cost for the link. These values are calculated at the central office or remote terminal level and can be rolled down to the census block level, as required.

Model Output:

The ACS Model contains a Tab labeled "Results" which presents by local serving area the following data:

1. The type of 2^{nd} mile link (fiber, microwave or satellite) required;
2. The number of households in the local serving area;
3. The expected number of broadband customers;
4. The census tract county of the area
5. The number of census blocks in the area;
6. The CQBAT model cost results for the area (July 29, 2011);
7. The per customer forward-looking microwave link costs if any in the area;
8. The per customer forward-looking satellite link costs if any in the area;
9. The per customer cost of the undersea cable link from Alaska to the peering locations in Seattle Washington, and Portland Oregon
10. The total forward-looking broadband costs per customer by area.